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CURRENT LITERATURE.

Laboratory manual of vegetable physiology.

The rapid development of vegetable physiology as a pedagogical subject is marked by the increase in text-books and manuals. The latest addition to the list is a work that will be received by every teacher of vegetable physiology with much satisfaction. We refer to the laboratory guide to the physiology of plants by Francis Darwin and E. H. Acton,¹ both of Cambridge University, England. Probably there is no English teacher of botany from whom a work of this kind will be so highly appreciated by botanists in general as from Mr. Francis Darwin. The fame of his illustrious father as a keen and original experimenter has to some extent been transmitted to the son, and has been supported and augmented by many profound and admirable pieces of independent research.

The work is divided into two parts. The first and larger part embraces general physiology, including such subjects as respiration, assimilation of carbon, transpiration, growth, and movements due to irritability. It is separated into 269 experiments, a number so large that the prominent topics which have engaged the attention of original investigators at different times are mostly represented. Often several experiments are devoted to the same inquiry, using different methods, and enabling the student to arrive at more or less accurate results. Although many experiments are arranged for the best apparatus obtainable, yet in each case the same principle is illustrated by experiments requiring only simple and inexpensive devices. Sometimes much is left to the ingenuity and judgment of the student. At times this is a good method, especially when the teacher sees that the student does not lose too much time in ascertaining the requisite or suitable procedure, but occasionally this method appears to be adopted by the authors to escape from the description of a tedious process. On the whole, however, the 269 experiments of the first part are admirably suited to illustrate the present status of vegetable physiology from the physical and mechanical side; they will add a fresh interest to laboratory work in this subject.

The second portion of the work, according to the preface, "treats a particular department of physiology in a more special manner;" that is, it is the part devoted to the chemical side of physiology. It is con-

¹DARWIN, FRANCIS and E. HAMILTON ACTON:—*Practical physiology of plants*. 12mo., pp. 321. 42 illust. in the text. Cambridge, Univ. Press, 1894. Macmillan & Co., New York, American publishers. \$1.60.

ceived in a very different spirit from the first part, however. It is not separated into experiments, but it is a short treatise upon chemical manipulation. In the opinion of the reviewer it is not a work upon chemical physiology, but upon physiological chemistry, and therefore, while admirably devised for teaching the student chemical methods, is not a legitimate part of a book devoted to botany. It occupies less than one-third of the volume.

It is noteworthy that ecological topics, commonly included to a greater or less extent in works upon vegetable physiology, have been wholly excluded.

A word of commendation is due the publishers for the neat and appropriate way in which the printing and binding have been done. An excellent index increases the usefulness of the work.

Alternation of generations.

This subject has long been a prominent one in both botany and zoology, and a clear, incisive presentation of any part of it will be acceptable to a large number of students. It is rare that any subject of such deep biological import and such wide reaching influence as this is more happily discussed and illustrated than in the recent work on gall flies and their production of oak galls by Dr. Hermann Adler,¹ englished with valuable additions by Charles R. Straton.

The alternate generations of gall-flies in certain species are very sharply marked, so much so that the sexual and agamic forms have been described under distinct genera. Mr. H. F. Bassett, of Connecticut, was the first to point out the probable connection between the two states, or rather to indicate that certain monosexual species were genetically connected with apparently distinct bisexual species. It was due to the labors of Dr. Adler, however, to fully establish the fact, and to work out the details in a considerable number of species by means of careful and patient observations and cultures.

The results have been of more than taxonomic importance. We have before us, in fact, a particularly clear and happy exposition of a number of topics which are commanding wide attention at the present time, such as the purposes of alternate generations, advantages of parthenogenesis, function of polar bodies, and the transmission of hereditary characters. Whoever is interested in such topics should not fail to read this attractively written work.

The botanist as well as the entomologist will find the book helpful

¹ADLER, HERMANN:—*Alternating generations: a biological study of oak gall flies.* Trans. and edited by Charles R. Straton. 12mo., pp. 198. 3 folded col. plates. Oxford, Clarendon Press, 1894. Macmillan & Co., New York, American publishers. \$3.25.

in the narrower domain of his specialty. The diversity of form and internal structure of the galls, and the fact that species are often distinguished more from the excrescence on the plant than from the appearance of the insect, should incite botanists to give them attention. The author takes up the evolution of the gall, its minute structure, and the question of its specific form, and brings forward many new facts and views.

The work closes with a list of the Cynipidæ, a bibliography of the subject, and a substantial index. The publishers have done their part well, providing a clear page, excellent colored plates, and an attractive binding.

A laboratory manual of bacteriology.

New manuals for laboratory use in bacteriology have been numerous of late. The last one comes from the University of Michigan, from a laboratory famous for good work. This volume by Dr. Novy¹ is more in the nature of outlines for the Michigan laboratory, than for general use (which will doubtless account for occasional crudities of diction and looseness of statement), yet many teachers will be grateful for its publication. It is interleaved with blank pages for memoranda, which some persons may consider an inconvenient form in which to keep notes. The directions for laboratory procedure are concise, apposite and easily followed. There are diagnoses, occupying a page each, of about twenty-five non-pathogenic forms and thirty pathogenic forms. A series of good lecture outlines, covering the most important topics relating to the general subject of bacteria, are interspersed with the laboratory directions, indicating the ground which the student should cover by lectures, recitations or additional reading.

Minor Notices.

DR. W. F. GANONG has distributed his paper¹ on the morphology and biology of Cactaceæ, which contains much interesting information concerning a much neglected and most interesting group of plants. Among the results obtained the following are noted: thorns and bristles are shown to be metamorphosed leaves; every leaf possesses an axillary bud which usually remains single, but in *Echinocactus*, *Mamillaria* (Cactus), *Anhalonium*, etc., the growing point is divided, the forking being neither lateral branching nor dichotomy, but a production of permanent tissue between two parts of the growing point;

¹NOVY, FREDERICK G.:—Directions for laboratory work in bacteriology, for the use of the medical classes in the University of Michigan. 8vo., pp. 209, interleaved. 2 pl. George Wahr, Ann Arbor, [1894]. \$1.50.

¹GANONG, WILLIAM FRANCIS:—Beiträge zur Kenntniss der Morphologie und Biologie der Cacteen. Inaugural-Dissertation, Munich. 1894.

the grooves are but the stretching out of the pulvini; the sheath in *Cylindropuntia* is formed from a coalescence of hairs; species of *Opuntia*, *Cereus*, *Mamillaria* possess honey-secreting structures which are always either ordinary or metamorphosed spines; the transverse rings shown by many thorns are due to alternating zones of air-containing and air-free tissue; the bundle systems of all genera are modifications of the typical system seen in *Opuntia*. By using a combination of vegetative and floral characters the generic relationships are indicated by the usual phylogenetic diagram. It is very valuable for our systematic work to have such careful morphological studies made, as too much of our work is based upon a very superficial morphology.

THE JOURNAL OF MYCOLOGY appears at such long intervals that a new number is especially noteworthy. The last one is no. 4, the final one of volume seven. It contains 146 pages of printed matter and six plates. Forty-eight pages, however, are devoted to an index of volume seven, and thirty-two to the continuation of the general bibliographical index of mycological literature. The latter is admirably done, and if it could only be reissued on cards, would be invaluable. The number is largely devoted to fungicides, and methods and results of their application. A fungus (*Aschersonia tahitensis* Mont.), new to the country, is reported by H. J. Webber as being of possible economic importance in Florida in checking the abundance of such scale insects on orange and other citrous fruits as secrete honeydew, and thus harbor the sooty mold, a serious fungous disease. Interesting field notes for 1892 by Erwin F. Smith, include especially a notice of root tumors of the peach. Nine articles of foreign literature are reviewed.

BORDEAUX MIXTURE as a fungicide is discussed at length by Mr. D. G. Fairchild¹ in a government bulletin from the Division of Vegetable Pathology. The method and completeness of the treatment of the subject much surpass that of the usual bulletin literature, and is greatly to be commended. The history of the adoption of the fungicide, its intimate mode of action, and the toxicology of the mixture are especially interesting parts of the essay. The thorough manner in which the subject is handled in all its bearings makes the work one of the most important contributions relating to fungicides issued up to the present time.

¹ FAIRCHILD, D. G.:—Bordeaux mixture as a fungicide. Bulletin No. 6 of the Division of Vegetable Pathology. 8vo. pp. 55 Washington, Government Printing Office. 1894.